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TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	09/385,584
	Filing Date	August 27, 1999
	First Named Inventor	Ball et al.
	Group Art Unit	2826
	Examiner Name	F. Abraham
	Attorney Docket Number	2269-3817US (97-1350)

ENCLOSURES (check all that apply)		
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Firm or Individual name	Brick G. Power Registration No. 38,581
Signature	
Date	April 25, 2005

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PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:

Ball, et al.

Serial No.: 09/385,584

Filed: August 27, 1999

For: METHOD OF DISPOSING
CONDUCTIVE BUMPS ONTO A
SEMICONDUCTOR DEVICE AND
SEMICONDUCTOR DEVICES SO
FORMED

Confirmation No.: 9380

Examiner: F. Abraham

Group Art Unit: 2826

Attorney Docket No.: 2269-3817US
(97-1350.00/US)

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REPLY BRIEF

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Attn: Board of Patent Appeals and Interferences

Sir:

This brief is in reply to the Examiner's Answer dated February 25, 2005 and is within the two-month period for response that has been set by 37 C.F.R. § 1.193(b)(1).

(4) STATUS OF AMENDMENTS

The “Status of Amendments” provided in the Examiner’s Answer identifies an “amendment after final rejection filed on 8/22/02 . . .,” that has not been entered. It appears that the document to which the Examiner refers is an Amendment Under 37 C.F.R. § 1.116 dated August 14, 2002, in which no claim amendments were presented. Further, the Brief on Appeal, at page 4, indicates that “no further claim amendments were made” after the Amendment dated February 21, 2002. Therefore, the “STATUS OF AMENDMENTS,” as set forth in the Brief on Appeal, is correct.

(7) GROUPING OF CLAIMS

The Examiner’s Answer, under the section labeled “Grouping of Claims,” indicates that “[t]he rejection of claims 1 and 14 stand or fall together because appellant’s brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof.” This explanation makes no sense, as claims 1 and 14 are no longer pending or under consideration in the above-referenced application.

As no other objections were made to the “GROUPING OF CLAIMS” provided for in the Brief on Appeal, it is respectfully submitted that the “GROUPING OF CLAIMS” is correct.

(8) ARGUMENT

A final rejection under 35 U.S.C. § 103(a) has been asserted against claims 33-37 and 41-56. Specifically, the Examiner asserts that the subject matter recited in each of these claims is unpatentable over the teachings and suggestions of U.S. Patent 5,672,542 to

Schweibert et al. (hereinafter “Schwiebert”). The following remarks supplement the reasoning provided in the Brief on Appeal of November 14, 2002, and the Reply Brief of May 6, 2003.

Independent claims 33, 43, and 49 are directed to solder masks that include apertures that are configured to define peripheral shapes of conductive structures.

It appears, from the Examiner’s response, that the Examiner does not appreciate at least two aspects of the limited nature of Schwiebert’s teachings: (1) that reflowed solder is spaced apart from the walls of the apertures of the solder mask; and (2) that only spherical or truncated spherical structures are formed as the solder is reflowed. Further, it appears that the Examiner does not appreciate that, in view of both of these teachings, it is the physical properties of the solder used in Schwiebert, not the configurations of the apertures of the solder masks disclosed therein, that determines the shape of each resulting solder ball.

The teachings of Schwiebert are quite clear with respect to the requirement that, following solder reflow, the walls of apertures of a solder mask be spaced apart from the surfaces of solder bumps that are formed within the apertures: a “minimum allowable bump-to-mask clearance [provides] for adequate stencil release.” Col. 5, lines 63-65.

Schwiebert also repeatedly teaches that once solder is reflowed, it assumes a spherical or truncated spherical shape. For example, at col. 5, line 32, Schwiebert mentions “the final bump volume of [a] sphere.” Also, at col. 7, lines 56-57, Schwiebert teaches that, “[u]pon reflow, the solder becomes spherical . . .” While it is noted that the latter teaching relates to solder balls that are formed upon circular pads, Schwiebert is silent as to the shapes of solder balls that are formed upon noncircular (*e.g.*, octagonal) pads—when combined with Schwiebert’s teaching that, upon reflow, the solder separates from the walls of the aperture, one of ordinary skill in the

art would readily expect such balls to be spheres or have similar, spheroid shapes. In fact, Schwiebert's teaching that the volume of a reflowed bump can be expressed as the volume of a truncated sphere is made without any limitation as to the shape of the pad upon which the bump is formed or the shape of the aperture within which the bump is formed. *See* col. 5, lines 31-39.

Regardless of the shapes of apertures of a solder mask, when the processes disclosed in Schwiebert are employed, the resulting solder bumps will have somewhat spherical shapes. Thus, the apertures of the solder masks taught in Schwiebert are not configured to define the peripheral shapes of the resulting conductive structures but, merely, their volumes.

Furthermore, as Schwiebert merely teaches aperture configurations and processes that would result in the formation of somewhat spherical solder bumps, one of ordinary skill in the art could not have been motivated by Schwiebert to modify the teachings of Schwiebert in such a way as to develop a solder mask with apertures that, in addition to defining the volume of a conductive structure, also define its shape. Rather, the only apparent source for such motivation would have been improper reliance upon the disclosure of the above-referenced application.

For these reasons, it is respectfully requested that the 35 U.S.C. § 103(a) rejections of claims 33, 43, and 49, and the claims depending respectively therefrom be reversed, and that each of these claims be allowed.

(10) CONCLUSION

Each of claims 33-37 and 41-56 recites subject matter which, under 35 U.S.C. § 103(a), is allowable over the subject matter taught in Schweibert. Accordingly, reversal of the 35 U.S.C. § 103(a) rejections of each of claims 33-37 and 41-56 is respectfully requested, as is the allowance of these claims.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "Brick G. Power", with a long horizontal flourish extending to the right.

Brick G. Power
Registration No. 38,581
Attorney for Applicants
TRASKBRITT, PC
P.O. Box 2550
Salt Lake City, Utah 84110-2550
Telephone: 801-532-1922

Date: April 25, 2005
BGP/ljb
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